



**SPLIT-LOCK BAR**

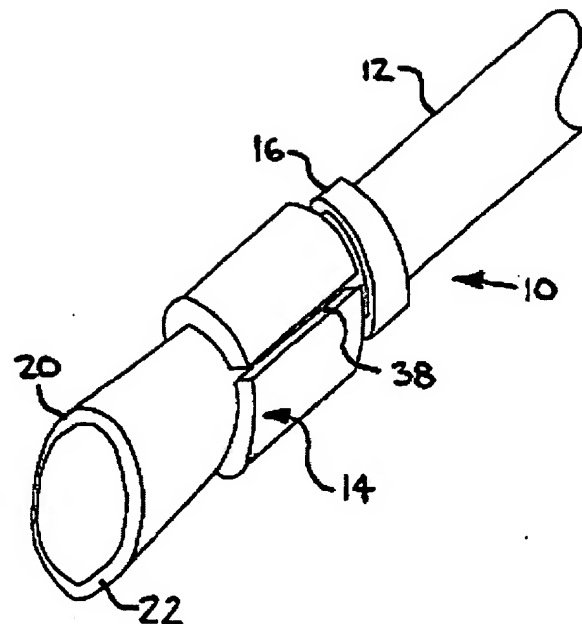
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**Cited documents**

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**Abstract of WO9607016**

A split-lock bar (10) for use in fixing into a hole, such as in a rock face for securely fixing a face plate or hook or the like onto the rock face. The split-lock bar (10) has a flared head (20) which carries a split collar (14) which is compressed as the split-lock bar (10) is forced into the hole and expands as it moves along the flared head (20) as force is applied to attempt to remove the split-lock bar (10) from the hole.



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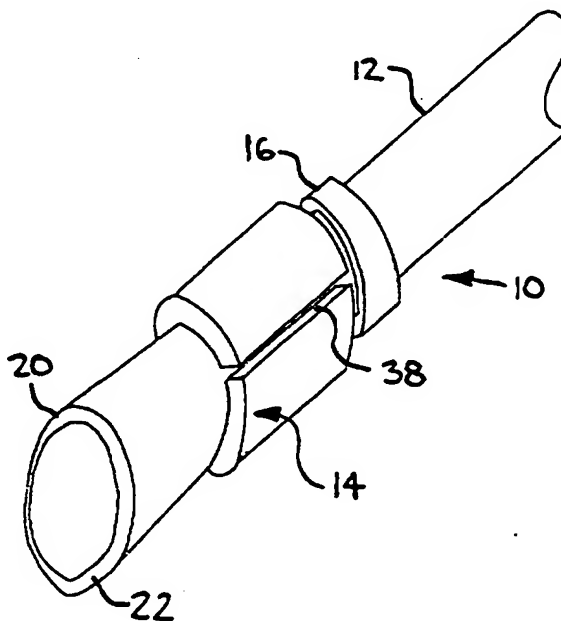
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(57) Abstract

A split-lock bar (10) for use in fixing into a hole, such as in a rock face for securely fixing a face plate or hook or the like onto the rock face. The split-lock bar (10) has a flared head (20) which carries a split collar (14) which is compressed as the split-lock bar (10) is forced into the hole and expands as it moves along the flared head (20) as force is applied to attempt to remove the split-lock bar (10) from the hole.



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TITLE

## SPLIT-LOCK BAR

FIELD OF THE INVENTION

The present invention relates to a split-lock bar  
5 particularly, although not exclusively, envisaged for use in  
fixing bolts and the like into holes such as in walls, rock  
faces, metal and wooden structures and the like. Mostly the  
split-lock bar is envisaged for use in mining situations where  
the fixing of large bolts into walls and rock faces is common  
10 place and is associated with some difficulties.

BACKGROUND OF THE INVENTION

In the mining industry it is known to use expandable bolts  
to fix into holes drilled in a rock face to fix retaining  
plates to the rock face (for stabilising the rock face against  
15 collapse or rock slide). A disadvantage of the expansion bolts  
is that the degree of securement of the bolt into the hole is  
limited to the nature of the expansion.

It is also known to grout bolts into such holes. A  
disadvantage of the use of grout is that the degree of  
20 securement of the bolt into the hole is limited to the  
integrity and strength of the grout.

It is also known to use expansion bolts in holes in bricks  
used in buildings, but with the same disadvantage. In metal  
and wooden structures bolts are usually threaded into holes or  
25 otherwise driven into the structure under force of a hammer or  
the like.

I have discovered that improved securement of a bolt into  
a hole can be achieved by using a split collar which contracts  
as the bolt is driven into the hole and which expands to jam  
30 into the hole when force is applied to withdraw the bolt from  
the hole.

SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to  
provide a split-lock bar which acts to jam into a hole when  
35 force is applied to withdraw the bar from the hole.

In accordance with one aspect of the present invention  
there is provided a split-lock bar for jamming into a hole, the  
split-lock bar comprising:

an elongate body having a free end with a flared head;

a retaining ring located about the elongate body and spaced apart from the free end;

a split collar located upon the elongate body between the free end and the retaining ring, the split collar being  
5 moveable axially upon the elongate body between the retaining ring and the free end, and the split collar being able to be contracted as the split-lock bar is driven into the hole and the split collar being able to be expanded by movement of the flared head axially with respect to the split collar as force  
10 is applied to withdraw the split-lock bar from the hole.

The present invention will hereinafter be described with particular reference to use in holes in rock faces, although it is to be understood that it is of general applicability.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 An exemplary embodiment of the present invention will now be described with reference to the accompanying drawings in which:-

Figure 1 is a perspective view, seen from above, of a split-lock bar in accordance with the present invention;

20 Figure 2 is a side view of the split-lock bar of Figure 1; Figures 3 and 4 are end views of the split-lock bar of Figure 1; and,

Figure 5 is a cross-sectional view of a split collar of the split-lock bar of Figure 1, shown to an enlarged scale.

#### 25 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

In the drawings there is shown a split-lock bar 10 comprising an elongate body 12, a split collar 14 and a retaining ring 16.

The elongate body 12 has a free end 19 at which is located  
30 a flared head 20. Typically, the elongate body 12 has a thread at its other end (not shown). The flared head 20 typically has a bevelled edge 22 to facilitate the introduction of the elongate body 12 into a hole, such as in a rock face. The threaded end of the elongate body 12 typically receives a nut  
35 for securing a plate or the like to the rock face.

The split collar 14 is substantially cylindrical on its outer surface 30 and on its inner surface 32 has a tapered portion 34 and a cylindrical bore 36. The tapered portion 34 is tapered at substantially the same angle as the flaring of

the flared head 20. The cylindrical bore 36 is greater in diameter than the diameter of the elongate body 12 for allowing axial movement of the split collar 14 along the elongate body 12 in the vicinity of the flared head 20.

5       The split collar 14 has a split 38 disposed along its length and typically substantially parallel to the axis of the split collar 14. The split 38 is typically at least as wide as the difference in diameter of the elongate body 12 and the internal diameter of the cylindrical portion 36 of the inner  
10 surface 32 of the split collar 14 so as to allow contraction of the split collar 14 about the elongate body 12 as the split-lock bar 10 is introduced into the hole. The split 38 thus allows the split collar 14 to reduce in diameter as the split-lock bar 10 is driven into the hole and to increase in diameter  
15 as force is applied to withdraw the split-lock bar 10 from the hole.

The retaining ring 16 is typically cylindrical and is conveniently welded to the elongate body 12 at a distance from the free end 19. The split collar 14 is located between the  
20 retaining ring 16 and the flared head 20 and is able to move axially along the elongate body 12 between the free end 19 of the elongate body 12 and the retaining ring 16. The retaining ring 16 bears against the split collar 14 as the split-lock bar 10 is driven into the hole for ensuring that the split collar  
25 14 enters into the hole and remains in close proximity to the flared head 20. That is, the retaining ring 16 prevents the split collar 14 from sliding all the way along the elongate body 12 as the split-lock bar 10 is driven into the hole. It is essential to keep the split collar 14 in close proximity to  
30 the flared head 20 so that the flared head 20 will cause the split collar 14 to expand and jam into the hole as an attempt is made to withdraw the split-lock bar 10 from the hole.

In use, a hole is drilled, in known manner, into the rock face. The hole is preferably drilled to a diameter which is  
35 substantially the same as the external diameter of the split collar 14. The free end 19 of the split-lock bar 10 is then inserted into the hole. This insertion is facilitated with the aid of the bevelled edge 22. As the split collar 14 meets the entry to the hole the split collar 14 is forced back along the

elongate body 12 towards the retaining ring 16. When the split collar 14 meets the retaining ring 16 it is prevented from slipping further along the length of the elongate body 12. The split-lock bar 10 is typically driven into the hole with a hammer or the like.

Once the split-lock bar 10 has been driven the desired distance into the hole force is applied to withdraw the split-lock bar 10 from the hole. Typically, this is achieved by threading a nut with a hook or the like to the threaded end of the elongate body 12 and pulling the hook in a direction out of the hole. This has the effect of causing the elongate body 12 to move in a direction out of the hole whilst the split collar 14 remains jammed into the hole. As the elongate body 12 moves with respect to the split collar 14 the flared head 20 rides along the tapered portion 34 of the split collar 14 and the split collar 14 becomes closer to the free end 19 of the elongate body 12. The movement of the split collar 14 with respect to the flared head 20 causes the split collar 14 to expand at the split 38. The expansion causes the split collar 14 to jam into the hole.

The amount of force of jamming of the split collar 14 into the hole increases as the amount of force on the elongate bar 12 for pulling the elongate bar 12 out of the hole increases. This is a major advantage of the split-lock bar 10 of the present invention.

Also, it is envisaged that the flared head 20 could be located (such as be threading or welding) upon the end of a hollow pipe. Similarly, the flared head 20 could be hollow so that grout could be pumped through the hollow pipe and through the flared head for increasing the force of engagement of the split-lock bar 10 into the hole.

Modifications and variations such as would be apparent to a skill addressee are considered within the scope of the present invention. For example, the split 38 in the split collar 14 could be shaped other than straight, such as, curved or slanted or the like. Also, a ridge could be provided on the tapered head for engaging with the split collar 14 for ensuring that the split collar 14 does not rotate upon the elongate body 12. This assists in ensuring that a nut can be threaded upon

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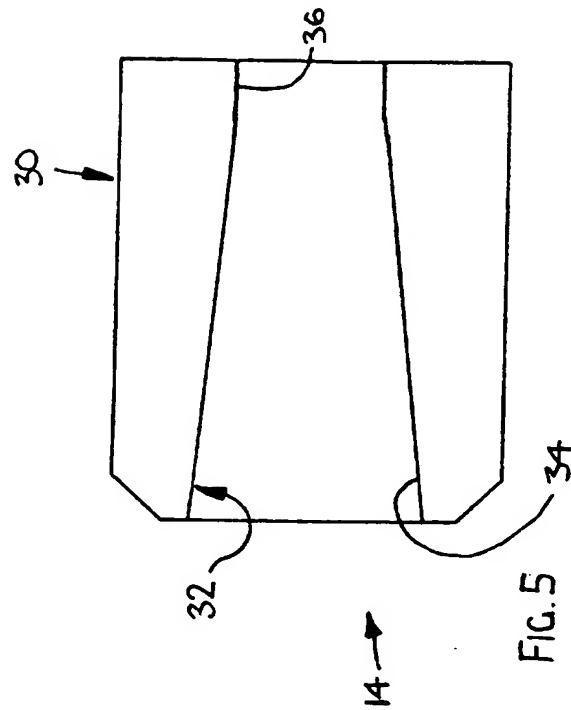
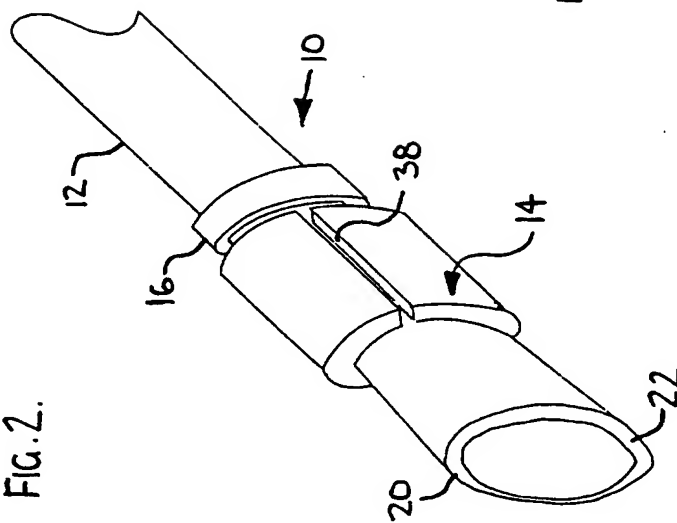
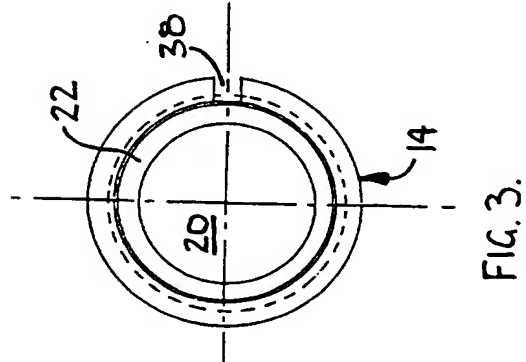
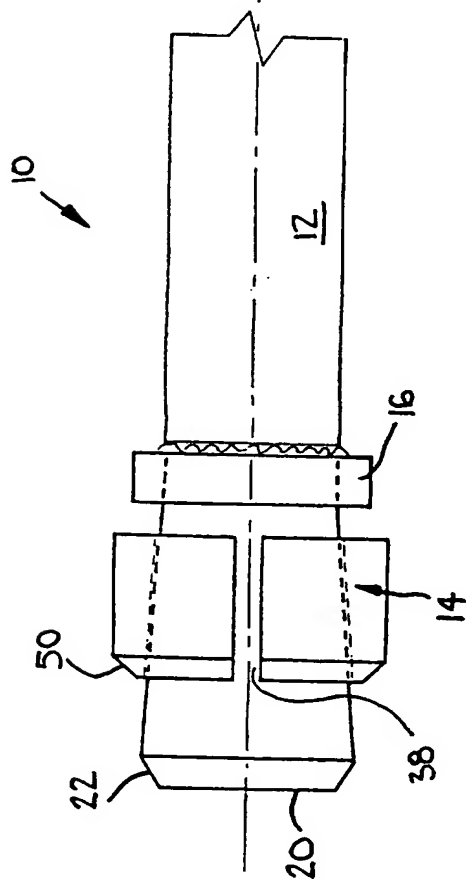
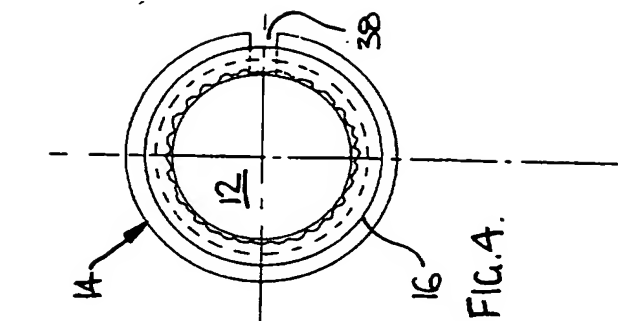
the threaded end of the elongate body 12. The ridge could be located within the slot 38 or it could be located in a groove in the inner surface 32 of the split collar 14. Further, a bevelled edge could be provided on the leading edge of the slit  
5 collar 14. Still further, a pattern could be provided on the outer surface 30 of the split collar 14 for increasing the frictional engagement of the split collar 14 with the hole. Still further



CLAIMS

1. A split-lock bar for jamming into a hole, the split-lock bar comprising:
  - an elongate body having a free end with a flared head;
  - 5 a retaining means located about the elongate body and spaced apart from the free end;
  - a split collar located upon the elongate body between the free end and the retaining means, the split collar being moveable axially upon the elongate body between the retaining
  - 10 means and the free end, and the split collar being able to be contracted as the split-lock bar is driven into the hole and the split collar being able to be expanded by movement of the flared head axially with respect to the split collar as force is applied to withdraw the split-lock bar from the hole.
- 15 2. A split-lock bar according to Claim 1, in which the flared head has a ridge disposed between the free end and the retaining means for inhibiting rotation of the split collar upon the flared head for allowing a threaded member such as a nut to be threaded onto the elongate body at its other end.
- 20 3. A split-lock bar according to Claim 1, in which the elongate body is hollow for allowing settable material to be pumped through the split-lock bar into the hole and about the flared head and the elongate body for setting the split-lock bar into the hole for increasing the force of fixing of the
- 25 split-lock bar into the hole.
4. A split-lock bar according to Claim 1, in which the split collar is substantially cylindrical on its outer surface and its inner surface has a tapered portion and a cylindrical bore, the tapered portion being tapered at substantially the same
- 30 angle as the flaring of the flared head for causing the split collar to expand as the split collar moves towards the free end, and the cylindrical bore being greater in diameter than the diameter of the elongate body for allowing axial movement of the split collar along the elongate body in the vicinity of
- 35 the flared head.

5. A split-lock bar according to Claim 4, in which the split collar has a split disposed along its length, the split being at least as wide as the difference in diameter between the elongate body and the internal diameter of the split collar so that the split collar can be forced to contract about the elongate body as the split-lock bar is driven into the hole.
6. A split-lock bar according to Claim 4, in which the split collar has a pattern formed into its cylindrical outer surface for increasing the force of engagement of the split collar with the hole.
7. A split-lock bar according to Claim 1, in which the free end has a bevel for facilitating the introduction of the split-lock bar into the hole.
8. A split-lock bar according to Claim 1, in which the split collar has a bevel on its end proximate the free end for facilitating the introduction of the split-lock bar into the hole.



**INTERNATIONAL SEARCH REPORT**International Application No.  
**PCT/AU 95/00546****A. CLASSIFICATION OF SUBJECT MATTER**Int Cl<sup>6</sup>: E21D 21/00

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**B. FIELDS SEARCHED**Minimum documentation searched (classification system followed by classification symbols)  
IPC E21D 21/00Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X Y	US 2 570 003 A (PALMER) 2 October 1951 Entire Document	1, 4-6, 8 2, 7
Y	DE 1 111 580 A (UBEREIN) 8 February 1962 Drawing and relevant description	2, 7

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 2 256 822 A (JOST) 6 June 1974 Drawings and relevant description	1, 2, 5 3, 4, 6-8
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No.

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